

REMARKS

The present Amendment is in response to the Examiner's Office Action mailed July 13, 2004. By this Amendment, claim 28 is amended, and new claims 47-68 are added. In view of this amendment, claims 28-68 are pending in the application.

By this amendment, independent claim 28 has been amended to more clearly define the claimed invention. Support for the amended and new claims is discussed below. No new matter has been added. Amendment or addition of certain claims is not to be construed as a dedication to the public of any of the subject matter of the claims as previously presented.

Claims 28-68 are currently under consideration. Reconsideration of the application is respectfully requested in view of the above amendments to the claims and the following remarks. For the Examiner's convenience, Applicant's remarks are presented in the order in which they were raised in the Office Action.

Applicant notes that the Examiner has determined claims 28-46 to be free of the prior art.

I. Examiner interviews

Applicant thanks the Examiner for initiating interviews with the Applicant's representative on July 2nd and 6th, 2004, regarding the status of the claims over prior art and support for claim language in claim 28. Applicant also thanks the Examiner for the telephonic interview in July 27, 2004 with the Applicant and his representatives in discussing claim amendments and support for the same in the Specification. Applicant appreciates the Examiner's efforts in discussing allowable language with the Applicant and his representatives.

II. Claim amendments

Claim 28 is amended and new claims are added to provide a clearer definition of the claimed invention. Clarifying amendments proposed by the Examiner to provide a nexus between the preamble and final methods steps during a telephonic interview on July 2, 2004 include amendments of the terms "location" and "individual" to the respective plurals. In addition, "smaller than about" is amended to "smaller than or about."

Following the interview with the Examiner on July 27, 2004, claim 28 is amended to specify that each sample occupies "an area smaller than or about 1 millimeter across."

In particular, the Specification teaches that “the current size of the microarray occup[ies] about 1.0 cm²” (page 6, line 4). A single microarray can be used to genotype “at least 60 ... individuals simultaneously” (page 6, lines 14 and 15). Specifically, the area of a 1.0 cm² microarray occupies 100 mm² (since 10 mm x 10 mm = 100 mm²). If 60 locations are placed within a 100 mm² microarray, each location can occupy a maximum area of $(100/60) = 1.67$ mm². The dimension “x” of each side of a square location occupying 1.67 mm² is 1.29 mm or **“about 1 mm across”** (such that $x^2 = 1.67$ mm²). Further, spots of other shapes can each fit within a square location. However, this calculation assumes complete coverage of the 1 sq. cm microarray whereas one skilled in the art would know that in order to be able to distinguish the signal from one location over that from an adjacent location some spacing is desirable.

The Specification teaches a ratio of 140 µm center-to-center-spacing between locations which are 100 µm across (page 6, line 6 and page 12, lines 5 and 6). In other words, a space of 140 µm across is used for a sample location (spot size) of 100 µm across. In order to accomodate such spacing between 60 locations in a 1 cm² microarray, each sample location must be about $(1.29 \text{ mm} \times 100/140) = 0.91$ mm across or **“less than 1 mm across.”** Numerous other examples of locations less than 1 mm across is found throughout the Specification and the Figures. For example, sample locations of 0.42 mm across (576 spots per cm²; page 6, line 8 and page 12, line 10), 0.32 mm across (1,000 spots per cm²; page 6, line 10), 0.14 mm across (5,184 spots per cm²; page 6, line 10), and 0.10 mm across (page 6, line 6 and page 12, lines 5 and 6) are disclosed in the Specification.

Further support for this amendment is found in the Specification, for example, at page 3, lines 28 and 29 (“space bar corresponds to 1.0 mm”); page 6, lines 3-27; page 12, lines 5-18; and Figures 3A, 3B, 4A, and 4B.

New claim 47 specifies that the microarray has at least 60 spots per cm². Support for this amendment is found as discussed above at page 6, lines 3-15 *inter alia*.

New claim 48 specifies the use of a microarray with an impermeable support. Impermeability is readily understood by those skilled in the art to be an inherent characteristic of the microscope slide and glass substrates disclosed on page 6, line 5 and page 7, line 16 of the Specification.

New claim 49 further specifies that the microarray has an impermeable surface. Support for this amendment is found, for example in microscope slides and glass substrates, at page 6, line 5 and page 7, lines 14-29 of the Specification.

New claim 50 specifies that the microarray has a permeable surface. Support for this amendment is found, for example, at page 7, lines 14-29 of the Specification. The Specification describes coatings and treatments for the surface of the support (e.g., gel pads, etc.) that are inherently permeable (page 7, lines 23-26).

New claim 51 specifies a microarray with a rigid support. Support for this amendment is found, for example in microscope slides and glass substrates, at page 6, line 5 and page 7, line 16 of the Specification.

New claim 52 further specifies that the support surface has a reactive group that allows specific attachment of the amplified polynucleotides to the support, as disclosed, for example, at page 7, lines 14-29 of the Specification.

New claims 53-68 depend from independent claim 48 and specify the same limitations as previously pending claims 29-46.

No new matter is added by these amendments.

III. Claim Rejection Under 35 U.S.C. § 112

Claims 28-46 stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement. The Examiner states that the Specification fails to support the claim limitation that the sample occupies "an area smaller than or about 1 square millimeter." In particular, the Examiner states that while the specification teaches spots of "about 100 μm ," it does not teach the upper limit of "about 1 millimeter."

In response, Applicant amend claim 28 to specify "each location occupying an area smaller than or about 1 millimeter across." Applicant submits that one skilled in the art would readily appreciate that the Specification teaches that the microarray spots can occupy an area smaller than or about 1 millimeter across, as specified by claim 28, as amended. In particular, the Specification teaches that "the current size of the microarray occup[ies] about 1.0 cm^2 " (page 6, line 4) and a single microarray can be used to genotype "at least 60 ... individuals simultaneously" (page 6, lines 14 and 15). As discussed in detail under section II above, one of skill in the art would find that these

and other dimensions disclosed in the Specification support sample locations that are "smaller than or about 1.0 mm across."

Additionally, Figs. 4A and 4B teach one skilled in the art that the spots on the microarray can be smaller than the 1.0 mm space bar in these figures and thus less than or about 1 mm across (page 3, lines 28 and 29).

New claim 47 specifies a "microarray contain[ing] at least 60 sample locations per cm²" and thus satisfies the requirements of 35 U.S.C. § 112, first paragraph.

Therefore, Applicant respectfully requests withdrawal of this rejection under §112. Applicant expresses his appreciation to the Examiner for discussing these arguments in a telephonic interview with Applicant's representatives on July 27, 2004.

IV. New Claims 48-68

As noted by the Examiner, independent claim 28 and claims 29-46 which depend therefrom, are free of the prior art.

Independent claim 48 specifies "with each sample in a distinct location on an impermeable support" in place of "with each sample in a distinct location, each location occupying an area smaller than or about 1 millimeter across" specified in claim 28.

The limitation of "each location occupying an area smaller than about 1 square millimeter" was introduced in Applicant's response filed April 29, 2004. In pages 9-10 of that amendment it was argued that the limitation distinguished over the cited Shuber reference (U.S. Pat. No. 5,834,181) in that Shuber disclosed permeable membrane supports and a sample location size limitation of "an area smaller than about 1 square millimeter" is not possible in a permeable membrane. The currently amended claim 28 retains the same distinction by specifying "each location occupying an area smaller than or about 1 millimeter across."

Applicant submits that the limitation in claim 48 of the sample "location on an impermeable support" similarly distinguishes over Shuber's membrane support. All other limitations of claim 48 are identical to the corresponding limitations in claim 28. Claims 53-68 depend from independent claim 48 and specify the same limitations as 29-46 (which depend from claim 28). Claims 49-52 specify additional limitations (surface characteristics, rigidity) that further modify the impermeable support of claim 48 but retain the distinctions from the Shuber reference.

Applicant respectfully submits that new claims 48-68 are allowable for the same reasons claims 28-46 were deemed free of the prior art. Applicant further submits that all limitations of claims 28-46 are clearly supported in the Specification as described in detail in Section II above.

CONCLUSION

In view of the amendments and arguments set forth above, Applicant earnestly believes that he is entitled to a letters patent and respectfully requests the Examiner to expedite prosecution of this patent application to issuance. Should the Examiner have any questions, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no.529492000100. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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